

Missouri.—Were of general occurrence throughout the state on the 2d, 3d, 6th, 16th, 22d.

Nebraska.—Nebraska City, 16th.

New Hampshire.—New Market, 4th.

New Mexico.—Silver City, 20th; Santa Fé, 21st, 22d.

North Carolina.—Hatteras, 4th; Weldon, 4th; Kittyhawk, 7th, 17th; Highlands, 12th, 17th, 22d; Chapel Hill, 17th; Charlotte, 18th.

Ohio.—North Lewisburg, 2d; Westerville, 2d; Cleveland, 14th, 15th; Margaretta, 14th.

Pennsylvania.—Erie, 14th; Meadville, 14th.

Tennessee.—Chattanooga, 11th, 15th; Memphis, 16th; Nashville, 14th, 15th, 16th.

Texas.—Fort Concho, 13th, 16th, 23d; Fort Davis, 11th, 23d; Palestine, 14th, 16th, 23d; Brownsville, 16th; Indianola, 17th, El Paso, 20th; Mason, 20th; Galveston, 16th, 23d; Coleman City, Fredericksburg, Eagle Pass, Henrietta, Fort McKavett, and Uvalde, on the 23d.

Virginia.—Fort Monroe, 8th.

Wisconsin.—Were reported by various stations throughout the state on the 15th and 16th.

OPTICAL PHENOMENA.

SOLAR HALOS.

Solar halos have been observed in the various districts, as follows:—

New England.—1st, 2d, 5th, 6th, 9th, 10th, 14th, 15th, 20th, 22d.

Middle Atlantic states.—6th, 9th, 10th, 12th, 13th, 20th, 22d, 24th.

South Atlantic states.—4th, 15th, 22d, 25th, 26th.

Florida.—23d, 27th.

Western Gulf.—18th, 20th, 25th, 26th.

Ohio valley and Tennessee.—1st, 2d, 4th, 8th, 9th, 10th, 12th, 13th, 15th to 18th, 20th, 23d.

Lower lakes.—1st, 10th, 23d, 24th, 27th.

Upper lakes.—1st, 4th, 7th, 9th, 10th, 12th, 13th, 17th, 20th, 21st, 24th, 27th.

Upper Mississippi valley.—1st to 4th, 7th to 10th, 12th, 13th, 15th, 17th to 21st, 24th, 25th.

Missouri valley.—3d, 4th, 8th, 9th, 11th, 13th to 16th, 19th, 20th, 27th.

Northern slope.—2d, 5th, 7th, 10th, 13th, 17th, 24th.

Northern plateau.—1st, 5th, 6th, 7th, 9th, 19th, 21st, 27th, 28th.

Middle Pacific.—3d, 8th, 13th, 16th, 18th, 19th, 20th, 24th, 26th.

South Pacific.—8th, 9th, 11th, 26th, 27th.

Solar halos were also reported by the following stations not included in the districts named above:—

Albany, Oregon, 5th; Fort Buford, Dakota, 4th; Prescott, Arizona, 8th, 24th; Salt Lake City, Utah, 18th.

LUNAR HALOS.

Lunar halos have been observed in the various districts, on the following dates:—

New England.—1st, 13th, 14th, 19th, 20th, 21st, 24th.

Middle Atlantic states.—11th to 16th, 19th, 20th, 21st, 23d.

South Atlantic states.—11th, 13th, 14th, 17th, 21st, 22d, 23d, 25th, 27th.

Eastern Gulf.—11th, 21st, 22d, 25th.

Western Gulf.—3d, 16th, 17th, 19th to 22d, 25th.

Rio Grande valley.—13th.

Ohio valley and Tennessee.—11th to 16th, 18th to 24th.

Lower lakes.—10th, 12th, 13th, 17th to 21st.

Upper lakes.—12th, 13th, 15th to 23d.

Extreme northwest.—15th, 19th, 20th, 22d.

Upper Mississippi valley.—4th, 12th to 23d.

Lower Missouri valley.—11th, 13th to 16th, 18th, 19th, 20th.

Northern slope.—13th, 16th, 21st.

Middle slope.—12th, 15th.

Southern slope.—13th, 15th, 18th, 19th.

Southern plateau.—11th, 13th, 14th, 20th, 21st, 23d, 24th, 25th, 28th.

Northern plateau.—15th, 19th, 20th, 26th.

California.—6th, 11th, 13th, 17th, 18th, 19th, 21st, 23d, 25th, 26th.

Lunar halos were also reported from the following stations, not included in the districts named above:—

Pensacola, Florida, 11th, 21st.

Salt Lake City, Utah, 17th, 18th, 21st.

Portland, Oregon, 20th.

Albany, Oregon, 27th.

Grand Haven, Michigan, 13th, an unusually large lunar halo was observed, the diameter being 84°.

MIRAGE.

Wicklow, Dakota, 11th.—The village of Madison, eleven miles distant, was plainly visible. On the 28th, mirage was observed from 7 to 9.30 a. m., between south-southwest and west-southwest, and was very remarkable for its extent and distinctiveness. Buildings were seen with their surroundings apparently at elevations of from 100 to 1,000 feet. In some instances they appeared inverted, and again in their natural positions above the inverted images. They were constantly changing in altitude in places, while in others they remained stationary.

Fort Maginnis, Montana, 14th.—At 8.30 this morning various points on the Yellowstone were visible, although some of them were one hundred and fifty miles distant. The buildings and flags of a military post were plainly seen at this place, and were recognized to be Fort Custer, nearly two hundred miles away.

Huron, Dakota, 26th.—Mirage observed from 8 to 9 a. m. Houses ten miles distant, not ordinarily visible, on account of swells in the prairie, were clearly seen, having the appearance of two structures, one resting upon the other in an inverted position. The Wessington Hills and Ree Heights, at distances of twenty-five and fifty miles, respectively, appeared as lofty glaciers. Fields in which corn-stalks were left standing appeared as forests of lofty, leafless trees. Ice on the river, in a bend five miles away, ordinarily hidden from view by high bluffs, could be seen as a sheet of opaque glass, showing distinctly the bends in the stream, and glistened in the sunlight. On the 28th, from 8 to 9.30 a. m., Triquois, eighteen miles east, was plainly visible, although ordinarily hidden from view by swells in the prairie.

Similar conditions were also observed at the following stations:—

Salina, Kansas, 8th.

Pretty Prairie, Kansas, 8th.

Genoa, Nebraska, 3d, 5th.

Alexandria, Dakota, 5th, 25th, 28th.

Wicklow, Dakota, 7th, 25th, 27th.

Barnegat City, New Jersey, 4th.

Indianola, Texas, 6th, 17th, 18th, 19th.

MISCELLANEOUS PHENOMENA.

SUNSETS.

The characteristics of the sky, as indicative of fair or foul weather for the succeeding twenty-four hours, have been observed at all Signal-Service stations. Reports from one hundred and seventy-two stations show 4,779 observations to have been made, of which fifteen were reported doubtful; of the remainder, 4,764, there were 4,091, or 85.9 per cent., followed by the expected weather.

SUN SPOTS.

North Lewisburg, Ohio.—Mr. H. D. Govey reports: Sun spots observed on all clear days during the month. They were the most numerous on the 8th, least numerous on the 25th, largest on the 15th, and smallest at close of the month. Magnetic variations on the 1st and 22d.

Port Eads, Louisiana, 15th.—A spot was observed on the sun's disc, slightly to the right of the centre, on this date.

The following record of sun spots for the month of February, 1883, has been forwarded by Mr. D. P. Todd, Director of the Lawrence Observatory, Amherst, Massachusetts:—

DATE— Feb., 1883.	No. of new		Disappeared by solar rotation.		Reappeared by solar rotation.		Total No. visible.		REMARKS.
	Gr'ps	Spots	Gr'ps	Spots	Gr'ps	Spots	Gr'ps	Spots	
1, 10 a. m.	1	10†	0	0	1	5	4	20†	{ Spots probably dis- appeared by solar rota- tion.
2, 11 a. m.	1	2	0	0	1	0	4	20†	
5, 3 p. m.	1	3	2	10†	1	3	3	15†	
7, 3 p. m.	2	15†	0	3	2	15†	3	30†	
8, 12 m.	0	0	0	0	0	0	6	25†	
9, 1 p. m.	0	5	2	5	0	0	4	25†	
10, 10 a. m.	0	0	0	0	0	0	4	25†	
12, 11 a. m.	2	20†	1	3	1	20†	5	45†	
13, 11 a. m.	0	10†	0	0	0	0	5	55†	
17, 1 p. m.	0	0	0	0	0	0	5	55†	
17, 4 p. m.	0	0	0	0	0	0	5	20†	
18, 12 m.	0	0	0	0	0	0	5	20†	
19, 12 m.	0	0	1	3	0	0	3	15†	
20, 9 a. m.	0	0	0	0	0	0	2	10†	
21, 10 a. m.	0	0	0	0	0	0	2	10†	
21, 9 a. m.	0	0	0	2	0	0	2	6	
22, 3 p. m.	0	0	0	0	0	0	2	6	
22, 1 p. m.	0	0	0	3	0	0	2	3	
23, 10 a. m.	0	0	2	3	0	0	0	0	
24, 12 m.	1	2	0	0	0	0	1	2	
26, 9 a. m.	0	2	0	0	0	0	1	4	
27, 10 a. m.	1	3	0	0	0	0	2	7	
28, 9 a. m.	0	0	0	0	0	0	2	7	

†Approximated. Faculae were seen at the time of every observation.

METEORS.

Heath, Massachusetts, 1st.—A brilliant meteor was observed to pass from a point near the north-star toward the southwestern horizon, leaving a dazzling path, which cast shadows.

Chambersburg, Pennsylvania, 8th.—A meteor was observed at 9.25 p. m., passing due north in the western sky at an altitude of 15°. It moved slowly, leaving a train of alternating bars of light in its path.

Harvard College Observatory, Cambridge, Massachusetts, 8th.—A meteor equal to "Arcturus" in brightness was observed at 11.15 p. m.

Punta Rassa, Florida, 8th.—At about 10.15 p. m. a brilliant meteor was observed in the eastern sky at about 20° above the horizon. It pursued a downward course, leaving no cloud or train. Its color was of a brilliant white, with a greenish tinge; it was visible about three seconds.

Springfield, Illinois, 22d.—A very bright meteor was observed at 6.15 p. m., moving from a point 45° west of north.

The s. s. "Bothnia," in N. 40° 54', W. 66° 15', at 10.30 p. m., 27th, observed a meteor of unusual brilliancy pass from north to south.

Olneyville, Rhode Island, 27th.—A brilliant meteor was seen in the western sky at about 10 p. m., which lighted up the surrounding country as far as the eye could reach. Its course was from northwest near the zenith toward southwest at the horizon. In appearance and color it resembled a huge electric light.

Other reports of this meteor are published elsewhere in the REVIEW in connection with the supposed earthquake which occurred at the time of its appearance at various points in Massachusetts, Rhode Island, and Connecticut.

Meteors of less brilliancy have been reported, as follows:—

Visalia, California, 7th, 9th, 18th, 21st, 23d.

Morrison, Illinois, 8th.

Fort Wayne, Indiana, 19th.

Vevay, Indiana, 27th.

Woodstock, Maryland, 24th.

Dudley, Massachusetts, 1st.

Umatilla, Oregon, 6th.

Austin, Tennessee, 27th.

Yuma, Arizona, 3d, 11th, 25th.

Monticello, Iowa, 8th.

EARTHQUAKES.

Bloomington, Illinois, 4th.—At 5 a. m., of this date, an earthquake shock was distinctly felt in this vicinity. A prolonged rumbling noise, lasting several seconds, was first heard,

followed by a report and a shock which was generally observed in all parts of the town.

Kalamazoo, Michigan, 4th.—Between 4 and 5 p. m., an earthquake shock was felt south of this place, and at various points in southern Michigan and northern Indiana. The shock was sufficient to crack the windows of buildings, and loosen stove-pipes, etc.

Wolfborough, New Hampshire, 4th.—At 3.05 p. m., an earthquake was felt here, rattling windows, crockery, and articles of furniture. The movement was from west to east, lasting five seconds. Another slight shock was felt at 3.15 p. m. Previous to the first shock, it was perfectly calm, but instantaneously with the earthquake, the air was set in rapid motion, continuing so during the afternoon.

Cornish, Maine, 4th.—An earthquake shock was felt at this place at 3.16 p. m.

It is interesting to note that at or about the time of the occurrence of these shocks in the United States, earthquakes were also felt at different points in Europe. The following reports by cable were published in the "New York Herald" of February 6, 1883:—

Agram, Hungary, February 5, 1883.—A severe shock of earthquake was felt here last evening.

Madrid, Spain, February 5, 1883.—Renewed shocks of earthquake have been felt in Murcia.

On the 27th, a shock was generally felt in southern Rhode Island, southeastern Connecticut, and at points in Massachusetts, concerning which the following reports have been received:—

Connecticut.—Norwich, 27th: During the evening an earthquake shock, lasting from three to five seconds, was felt in this city. It was accompanied by a deep rumbling noise, and shook buildings in an alarming manner.

New London, 27th: Sergeant John G. Lynch, Signal Corps, U. S. A., reports as follows: "At 10.08 p. m., the residents in the northwestern part of the city and in a direct line from southwest to northeast, experienced a supposed shock of earthquake which was followed, about two seconds later, by a rumbling noise resembling the passing of a heavy train. The noise was heard throughout the city and vicinity, but the concussion was confined to a belt of less than one hundred and fifty yards in width and along the line described above. In neighboring towns, the impression that an earthquake shock had occurred was general, but it is worthy of note that the shock was scarcely felt except by persons within doors, and that the principal evidence of the earthquake was the rattling of doors and windows, which is commonly experienced during thunder-storms and in cases of violent explosions. This disturbance was in all probability due to the passage of a meteor of unusual size in close proximity to the earth. Simultaneously with the supposed earthquake shock, a large and exceedingly brilliant detonating meteor passed over this city from southwest to northeast. It was visible less than one second, and was described as a long streak of intense blue light, leaving no cloud at its disappearance."

Bristol, 27th: Two severe shocks, resembling an earthquake, were felt here at about 10.15 p. m. In certain localities, buildings were shaken, and the glass in windows and crockery rattled. The shock lasted from five to ten seconds.

East Greenwich, 27th: An earthquake shock was very sensibly felt about 10 p. m. At Coweset, a granite residence was so shaken as to spring a burglar-alarm. Two rumbles were heard, separated by an interval of about fifteen seconds.

Rhode Island.—Newport, 27th: A brilliant meteor was observed in the northern sky between 10.10 and 10.20 p. m., and was described as being about the size of a street-lamp, of greenish color, and passed toward the northeast, where it exploded. The noise caused by the explosion, was heard in all parts of the city, and was supposed by many to have been caused by an earthquake shock. Dishes rattled, globes were shaken from chandeliers, and a few windows were broken. Some persons report having experienced a tremulous motion

of the earth, but the effect was generally compared to that of a heavily loaded wagon passing over frozen ground.

Point Judith, 27th: At 10.15 p. m., an earthquake shock occurred lasting five seconds, accompanied by a rumbling sound; a second shock of less force was felt at 10.18 p. m., and a third, very feeble, occurred at 10.28 p. m. The movement was apparently from east to west.

Narragansett Pier, 27th: A severe shock of earthquake was felt at 10.15 p. m., accompanied by a low, rumbling sound, of fifteen seconds duration. All houses were badly shaken and the inhabitants frightened. A second, but less severe shock, occurred at 10.18 p. m., lasting five seconds; and a third shock, very light, of three seconds duration was felt at 10.28. The direction of movement was from east to west.

Block Island.—At 10.15 p. m. this island was visited by a severe shock of earthquake which lasted about eight seconds. It appeared to pass from the west, and when nearest produced a noise resembling that made by a passing train. Houses were badly shaken. The keeper of the Southeast Light reports that articles in the light tower were displaced by the shaking of the building. A second shock, very faint, was felt at 10.17 p. m. The captain of a pilot-boat, while off Fire island observed a large meteor at 10 p. m., passing from east to west. It was so brilliant, that a paper could have been read without difficulty from its light. The meteor was observed at Block Island just before the first shock was felt.

Massachusetts.—New Bedford, 27th: a shock of earthquake was felt here at 10.30 p. m., accompanied by a rumbling sound and tremor, resembling that caused by a heavily loaded wagon passing over frozen ground.

Heath, 27th: A light shock of earthquake was felt throughout the city at 10.20 p. m.

Fall River, 27th.—At 10.20 p. m., a noise was heard sounding like the firing of a heavy ordnance, and was accompanied by a vibration of the earth, causing windows, etc., to rattle.

Barrington, 27th.—An earthquake shock was felt at about 10 p. m., in various parts of the town, sufficient to shake buildings with considerable force.

California.—San Diego, 6th: a slight earthquake shock occurred here at 4.30 p. m.; the direction of movement was from north to south.

The bark "Siddartha," in N. 20° 04', W. 67° 45', on February 19th, at 7 p. m., experienced a sharp shock of earthquake which lasted about twenty-five seconds. The ship trembled as if dragging over a hard bottom; found no soundings at thirty fathoms.

SAND-STORMS.

Camp Thomas, Arizona, 2d, 19th.
Tucson, Arizona, 18th, 19th.
Yuma, Arizona, 2d, 4th.
Fort Yuma, California, 14th.
Fort Garland, Colorado, 1st, 2d.
Fort Union, New Mexico, 15th.
El Paso, Texas, 3d, 6th, 15th.

POLAR BANDS.

Los Angeles, California, 19th.
Wicklów, Dakota, 7th, 11th, 25th, 26th, 27th.
Washington, District of Columbia, 20th.
Augusta, Georgia, 3d, 8th, 25th.
Riley, Illinois, 20th.
Guttenburg, Iowa, 22d.
Keokuk, Iowa, 4th.
Yates Centre, Kansas, 1st, 5th, 21st.
Point Pleasant, Louisiana, 25th, 27th.
Gardiner, Maine, 17th.
Dudley, Massachusetts, 2d.
Lansing, Michigan, 6th, 9th, 21st.
Protém, Missouri, 1st, 12th, 20th, 25th, 27th.
Clear Creek, Nebraska, 12th, 21st.

Freehold, New Jersey, 8th.
Moorestown, New Jersey, 9th.
Rochester, New York, 6th.
Catawissa, Pennsylvania, 9th.
Nashville, Tennessee, 12th, 14th, 18th, 21st.
Palestine, Texas, 23d.
Marion, Virginia, 28th.
Wytheville, Virginia, 1st, 10th, 13th, 20th.

ZODIACAL LIGHT.

In the various states and territories, it was visible on the following dates:—

Arizona.—Prescott, 3d to 7th, 25th to 28th.
Connecticut.—New Haven, 7th, 8th, 25th, 26th.
Dakota.—Wicklów, 3d to 7th, 9th, 24th, 25th to 28th.
Florida.—Punta Rassa, 1st.
Georgia.—Augusta, 4th.
Illinois.—Springfield, 26th, 27th, 28th.
Indiana.—Wabash, 7th, 8th.
Iowa.—Cresco, 4th, 7th, 8th, 9th, 28th; Monticello, 1st, 5th, 8th, 9th, 27th.
Kansas.—Lawrence, 3d, 7th; Salina, 26th, 27th, 28th; Yates Centre, 7th, 25th.
Maine.—Cornish, 4th, 5th, 7th, 8th, 9th.
Massachusetts.—Cambridge, 1st, 5th, 7th, 8th, 9th, 23d, 25th to 28th; Rowe, 8th, 9th; Somerset, 5th, 7th, 8th, 26th, 28th.
Minnesota.—Northfield, 3d, 4th, 5th, 7th, 9th, 27th, 28th.
Nebraska.—Clear Creek, 7th, 24th to 28th.
Oregon.—Albany, 1st, 2d, 6th to 9th, 22d, 23d.
Pennsylvania.—Dyberry, 7th; Haverford College, 14th.
Tennessee.—Nashville, 1st, 2d, 3d, 8th, 25th to 28th.
Texas.—Fort McKavett, 28th; Palestine, 19th.
Virginia.—Variety Mills, 1st, 5th, 7th, 8th, 26th, 27th, 28th.
Wisconsin.—Franklin, 7th, 8th, 9th, 27th, 28th; Manitowoc, 27th.

PRAIRIE AND FOREST FIRES.

Little Rock, Arkansas, 1st.
Creswell, Kansas, 28th.
Independence, Missouri, 19th to 22d, 25th to 28th.
Protém, Missouri, 1st, 20th, 26th, 27th, 28th.
Coleman City, Texas, 2d.
Fort Concho, Texas, 1st.
Fort McKavett, Texas, 2d, 24th, 25th.
Fort Sill, Texas, 21st.

MIGRATION OF BIRDS.

Geese flying northward.—Sacramento, California, 19th; Fort Madison, Iowa, 17th, 27th; Swanwick, Illinois, 22d, 24th; Independence, Kansas, 21st; Yates Centre, Kansas, 27th; Salina, Kansas, 14th; Pretty Prairie, Kansas, 19th; Clear Creek, Nebraska, 22d, 26th, 28th; Genoa, Nebraska, 26th; Superior, Nebraska, 27th; Augusta, Georgia, 24th; Fort Sill, Indian Territory, 21st; Lewiston, Idaho, 22d; Portland, Oregon, 22d; Cape Mendocino, California, 21st. Flying southward.—Creswell, Kansas, 11th; Fort Riley, Kansas, 25th; Augusta, Georgia, 19th, 25th. Flying west.—Creswell, Kansas, 7th, 25th; Fremont, Nebraska, appearing in large numbers, 22d; Wellington, Kansas, appearing in large numbers, 25th to 28th. Ducks flying northward.—Sacramento, California, 19th; Charleston, Illinois, 20th; Swanwick, Illinois, 22d, 24th; Yates Centre, Kansas, 21st, 23d, 26th, 27th; Fort Scott, Kansas, 28th; Clear Creek, Nebraska, 22d, 28th; Genoa, Nebraska, 27th; Toledo, Ohio, 25th. Flying southward.—Creswell, Kansas, 26th; Superior, Nebraska, 27th; Palestine, Texas, 11th; Wellington, Kansas, appearing in large numbers, 25th to 28th.

NOTES AND REMARKS.

NOTE.—The Chief Signal Officer has received a copy of the report of meteorological observations made at the Carson Observatory, Carson City, Nevada, during 1880, 1881, and 1882, by Mr. Charles W. Friend.